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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Eric Coupart

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06/17/2004

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EXAMINER

CUEVAS, PEDRO J

ART UNIT

PAPER NUMBER

2834

DATE MAILED: 06/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n N .

09/843,808

Applicant(s)

COUPART ET AL.

Examin r

Pedro J. Cuevas

Art Unit

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-- The MAILING DATE of this c mmunication appears on the cover sheet with the correspondence address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 13-44 is/are rejected.
- 7) ☒ Claim(s) 9-12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 April 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/17/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see pages 1-3, filed March 25, 2004, with respect to the rejection(s) of claim(s) 1-44 under 35 U.S.C. § 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of U.S. Patents No. 5,066,880 to Banon.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 1, 16-17, 37-39, and 43-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,066,880 to Banon in view of U.S. Patent No. 6,144,132 to Nashiki.

Banon clearly teaches the construction of a permanent magnet poly-phase synchronous machine comprising:

a flux-concentrating rotor (5, of the flux concentrating type - Abstract) comprising permanent magnets (12) disposed between non-magnetically interconnected pole pieces (14);

a stator (2) comprising an annular portion and teeth; and

a winding (9).

However, it fails to disclose a stator comprising teeth having a free end deprived of pole swellings, and a concentrated winding.

Nashiki teach the construction of a permanent magnet motor comprising:

a stator (2) comprising teeth (1) having a free end deprived of pole swellings; and
a concentrated winding (53);

for the purpose of providing a motor with an increase in torque generated, increase in efficiency, decrease in size, decrease in cost, and reduction of torque ripples.

It would have been obvious to one skilled in the art at the time the invention was made to use the switched reluctance rotator construction disclosed by Nashiki on the permanent magnet poly-phase synchronous machine disclosed by Banon for the purpose of providing a motor with an increase in torque generated, increase in efficiency, decrease in size, decrease in cost, and reduction of torque ripples.

4. With regards to claims 16 and 17, it would have been obvious to one having ordinary skill in the art at the time the invention was made to arrange the rotor to rotate in the range of 1,000 to 10,000 rpm and it's outside dimension in the radial direction lying in the range of 50 mm to 1 m, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

In re Aller, 105 USPQ 233.

5. With regards to claims 37 and 38, it would have been obvious to one having ordinary skill in the art at the time the invention was made to exchange the position of the stator and rotor, since it has been held that rearranging parts of an invention involves only routine skill in the art.

In re Japikse, 86 USPQ 70.

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6. Claims 2-3, 15, 18, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,066,880 to Banon in view of U.S. Patent No. 6,144,132 to Nashiki as applied to claim 1, 16-17, 37-38, and 43-44 above, further in view of U.S. Patent No. 6,335,582 to Abukawa et al.

Banon in view of Nashiki disclose the construction of a permanent magnet poly-phase synchronous machine as described above (Office Action paragraph 3).

However, they fail to disclose the pole pieces and the magnets are configured so as to minimize the difference $L_d - L_q$ where L_d is inductance on a forward axis and L_q is inductance on a quadrature axis.

Abukawa et al. disclose the construction of a rotary electric machine wherein:

the pole pieces and the magnets are configured so as to minimize the difference $L_d - L_q$ where L_d is inductance on a forward axis and L_q is inductance on a quadrature axis (Figure 3);

the teeth are of non-constant width, increasing in width with increasing distance from the rotor starting from a determined distance from their free ends (Figure 2);

the stator having n_{teeth} teeth, the rotor having n_{pairs} pairs of poles, and the current having n_{phases} phases, wherein the number of teeth n_{teeth} satisfies $n_{\text{teeth}} = n_{\text{pairs}} * n_{\text{phases}}$ (Figure 6);

the stator has individual coils each removably disposed on one tooth (Figure 6);
and

constitutes a synchronous motor.

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It would have been obvious to one skilled in the art at the time the invention was made to use the stator disclosed by Abukawa et al. on the dynamoelectric machine disclosed by Nashiki for the purpose of providing a permanent magnet rotating machine with large motor torque and high generating voltage.

7. Claims 4-8, 13-14, 30, and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,066,880 to Banon in view of U.S. Patent No. 6,144,132 to Nashiki as applied to claim 1, 16-17, 37-38, and 43-44 above, further in view of U.S. Patent No. 4,618,792 to Yates.

Banon in view of Nashiki disclose the construction of a permanent magnet poly-phase synchronous machine as described above (Office Action paragraph 3).

Yates disclose a rotary electric machine wherein:

the magnets are wedge-shaped when observed along an axis of rotation of the rotor, of width that tapers going away from the axis of rotation of the rotor (Figure 1);

the pole pieces have cutouts and are engaged via said cutouts on splines on a shaft of the rotor (Figure 1);

the splines are formed integrally with a central portion of the shaft (Figure 1);

the pole pieces have radially inner edges and gaps are left between said radially inner edges and the shaft (Figure 1);

each pole piece has, on a side facing towards the stator, a face that is non-circular around an axis of rotation of the rotor and convex towards the stator (Figure 1);

magnets have edges that are adjacent to the stator and the rotor has at least one at one axial end, a cheek-plate of non-magnetic material, with a periphery of the cheek-plate being set back from said edges (Figure 1);

the magnetic circuit of the stator comprises an assembly of sectors defining air-gaps intersecting the teeth at half width (Figure 1);

the sectors have co-operating portions in relief on docking sides;

the magnetic circuit inserted by force into a cylindrical case.

It would have been obvious to one skilled in the art at the time the invention was made to use the rotor disclosed by Yates on the permanent magnet poly-phase synchronous machine disclosed by Banon in view of Nashiki for the purpose of providing a permanent magnet rotating machine with large motor torque and high generating voltage.

8. With regards to claim 6, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the splines integrally with a central portion of the shaft, since it has been held that forming in one piece an article, which has formerly been formed in two pieces and put together, involves only routine skill in the art. *Howard v. Detroit Stove Works*, 150 U.S. 164 (1893). The term “integral” is sufficiently broad to embrace constructions united by such means as fastening and welding. *In re Hotte*, 177 USPQ 326, 328 (CCPA 1973).

9. With regards to claim 7, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the splines and the central portion of the shaft of a non-magnetic material, in particular of aluminum, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

10. Claims 19-21 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,066,880 to Banon in view of U.S. Patent No. 6,144,132 to Nashiki as applied to claims 1, 16-17, 37-38, and 43-44 above, and further in view of U.S. Patent No. 3,870,982 to Shibano et al.

Banon in view of Nashiki discloses the construction of a permanent magnet poly-phase synchronous machine as described above (Office Action paragraph 3).

However, it fails to disclose a stator having at least one individual coil comprising a plurality of superposed turns of a substantially flat bundle of insulated wires wound around a winding axis, the cross-section of the bundle having a long dimension that extends substantially perpendicularly to the winding axis.

Shibano et al. teach the construction of an impregnated electromagnetic coil having:

an individual coil (Figure 1) comprising a plurality of superposed turns of a substantially flat bundle of insulated wires of circular section, wound around a winding axis, the cross-section of the bundle having a long dimension that extends substantially perpendicularly to the winding axis for the purpose of providing an improved working property in the manufacture of coils, reduction in manufacturing costs, and an improved space factor; and

the inside section of the coil perpendicular to the winding axis is substantially rectangular.

It would have been obvious to one skilled in the art at the time the invention was made to use the impregnated electromagnetic coil disclosed by Shibano et al. on the permanent magnet poly-phase synchronous machine disclosed by Banon in view of Nashiki for the purpose of

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providing an improved working property in the manufacture of coils, reduction in manufacturing costs, and an improved space factor.

11. With regards to claim 20, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select the wires having a diameter lying in the range 0.3 mm to 2.5 mm, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

12. Claims 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,066,880 to Banon in view of U.S. Patent No. 6,144,132 to Nashiki, further in view of U.S. Patent No. 3,870,982 to Shibano et al. as applied to claims 19-21 and 41 above, and further in view of U.S. Patent No. 6,335,582 to Abukawa et al.

Banon in view of Nashiki further in view of Shibano discloses the construction of a permanent magnet poly-phase synchronous machine as described above (Office Action paragraph 10).

However, it fails to disclose an inside section of the coil perpendicular to the winding axis being larger on one side than on the other, and the stator comprises a tooth presenting a complementary profile.

Abukawa et al. teach the construction of a rotary electric machine comprising:

an inside section of the coil perpendicular to the winding axis being larger on one side than on the other, and the stator comprises a tooth presenting a complementary profile;

wires are curved to form hooks at the electrical connection ends of the coil;

the hooks are directed towards a midplane of the coil, perpendicular to the winding axis; and

the coil has, perpendicular to the winding axis, an inside section longer than an axial dimension of the tooth on which the coil is engaged, and a detector suitable for delivering a signal representative of rotation of the rotor being engaged in a gap formed between an inside face of the coil and a face of the tooth;

for the purpose of providing a permanent magnet rotating machine with large motor torque and high generating voltage.

It would have been obvious to one skilled in the art at the time the invention was made to use the rotary electric machine construction disclosed by Abukawa et al. on the permanent magnet poly-phase synchronous machine disclosed by Banon in view of Nashiki further in view of Shibano for the purpose of providing a permanent magnet rotating machine with large motor torque and high generating voltage.

13. Claims 26-29, 40, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,066,880 to Banon in view of U.S. Patent No. 6,144,132 to Nashiki as applied to claims 1, 16-17, 37-38, and 43-44 above, further in view of U.S. Patent No. 4,688,951 to Guers.

Banon in view of Nashiki discloses the construction of a permanent magnet poly-phase synchronous machine as described above (Office Action paragraph 3).

However, it fails to disclose a dynamoelectric machine having:

at least one detector comprising a magnetic field sensor mounted on the stator in such a manner as to detect the magnetic field of the magnets of the rotor from a location

that overlaps a peripheral region of the rotor when the machine is observed on the axis of rotation of the rotor;

for n-phase AC, the machine having n detectors mounted on consecutive teeth close to an opening in a case of the machine;

wherein the detector(s) is/are fixed to the magnetic circuit of the stator so as to extend along the radial axis of a tooth and the or each detector includes not only a magnetic field sensor, but also a temperature sensor.

Guers teach the construction of a roller bearing with contactless transmission of electric signals having magnetic field and temperature sensors (8 and 23) for the purpose of providing contactless transmission of electric signals between the roller bearing and the electric circuits.

It would have been obvious to one skilled in the art at the time the invention was made to use the sensor arrangement disclosed by Guers on the dynamoelectric machine disclosed by Nashiki in view of Abraham et al. in view of Abukawa et al. in view of Yates for the purpose of providing contactless transmission of electric signals between the different parts of the dynamoelectric machine.

14. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,066,880 to Banon in view of U.S. Patent No. 6,144,132 to Nashiki as applied to claims 1, 16-17, 37-38, and 43-44 above, further in view of U.S. Patent No. 4,896,839 to Curtis, Jr. et al.

Banon in view of Nashiki discloses the construction of a permanent magnet poly-phase synchronous machine as described above (Office Action paragraph 3).

However, it fails to disclose a dynamoelectric machine wherein the connection ends are soldered to locally stripped portions of sheathed electric cables.

Curtis, Jr. et al. teach the use of an apparatus and method for winding a strip of material into an arcuate elongated passage by forming connection ends (Figure 3), which are soldered to locally stripped portions of sheathed electric cables, for the purpose of providing a toroidal electrical transformer with continuous windings and a continuous wound core.

It would have been obvious to one skilled in the art at the time the invention was made to use the wires and winding method disclosed by Curtis, Jr. et al. on the permanent magnet poly-phase synchronous machine disclosed by Banon in view of Nashiki for the purpose of providing a toroidal electrical dynamoelectric machine with continuous windings and a continuous wound core.

15. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,066,880 to Banon in view of U.S. Patent No. 6,144,132 to Nashiki as applied to claims 1, 16-17, 37-38, and 43-44 above, further in view of U.S. Patent No. 3,979,821 to Noodleman.

Banon in view of Nashiki discloses the construction of a permanent magnet poly-phase synchronous machine as described above (Office Action paragraph 3).

However, it fails to disclose the use of aluminum as the non-magnetic material used to construct rotor parts.

Noodleman teach the method of manufacturing a rare earth permanent magnet rotor comprising an aluminum central portion for the purpose of providing a light weight, low cost, high strength, and high melting point rotor casting.

It would have been obvious to one skilled in the art at the time the invention was made to use the method of manufacturing a rare earth permanent magnet rotor disclosed by Noodleman on the construction of the permanent magnet poly-phase synchronous machine disclosed by

Banon in view of Nashiki for the purpose of providing a light weight, low cost, high strength, and high melting point rotor casting.

Allowable Subject Matter

16. Claims 9-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

17. The following is a statement of reasons for the indication of allowable subject matter.

The prior art does not teaches the construction of a dynamoelectric machine according to claim 5, wherein as stated by claim 9:

the cross section of each spline presents a profile having opposite sides with inclined portions at an angle θ to a radius passing through the middle of the spline, said angle being selected in such a manner as to make it possible for said splines to be made out of a material having weaker shear strength than the material used for making the pole pieces.

18. Claims 10-12 are considered allowable by their dependence on claim 9.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pedro J. Cuevas whose telephone number is (571) 272-2021. The examiner can normally be reached on M-F from 8:30 - 6:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on (571) 272-2044. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Pedro J. Cuevas
June 14, 2004



KARL TAMAI
PRIMARY EXAMINER